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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/910,583	07/20/2001	Kevin Mukai	5047	1386
32588	7590	11/24/2006	EXAMINER	
APPLIED MATERIALS, INC. P. O. BOX 450A SANTA CLARA, CA 95052			TUROC, DAVID P	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 11/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	09/910,583	MUKAI ET AL.	
	Examiner	Art Unit	
	David Turocy	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 14-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>10/14/2003</u>  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendments, filed 9/29/2006, have been fully considered and reviewed by the examiner. The examiner notes the amendment to claim 18, claims 14-19 remain pending.

### ***Election/Restrictions***

2. Applicant's election without traverse of claims 1-19 in the reply filed on 4/26/06 is acknowledged.

### ***Information Disclosure Statement***

3. The information disclosure statement (IDS) submitted on 10/10/2003 was considered by the examiner. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner. The examiner has attached the original copies of the IDS's for the applicants record.

### ***Response to Arguments***

4. Applicant's arguments filed 4/26/06 have been fully considered but they are not persuasive.

The applicant has argued against the EP 403 reference, stating the reference discloses stabilizing the gas mixture ratio before introducing the gas and therefore fails to disclose stabilizing individual flows. The examiner respectfully disagrees. While EP 403 may disclose stabilizing the gas mixture ratio, such a disclosure suggests that the gases are individually stabilized. To stabilize the ratio of the gases in a mixture, each of the gases in the mixture must each individually be stable. If one of the gases in a

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mixture is not stable then the entire mixture will not be stable. Therefore by stabilizing a gas comprising all the components, then each gas is individually stabilized. At the very least, to stabilize the ratio of a mixture, it would have been obvious to one of skilled in the art to stabilize each gas flow individually to achieve the desired result of stabilizing the ratio of the gases.

All other arguments are directed to newly added limitations that were not present at the time of the rejection and therefore will be addressed below in the art rejections.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over KR 2001055915 (KR 915) in view of EP 843348 (EP 348).

KR 915 discloses a method comprising providing a substrate having a silicon nitride layer, depositing a BSG film of 10-150 Angstroms thickness thereon by flowing source gases, depositing a film of BPSG on the BSG layer, and then flowing hydrogen and oxygen over the structure at a temperature of 800-900 °C for 10-60 seconds (Derwent abstract). As the BSG layer has thicknesses in the claimed range, it will inherently prevent reaction of phosphorus with the nitride layer.

KR 915 does not explicitly disclose that the substrate is provided in a reaction chamber, or that silicon, oxygen, and boron sources are provided into the chamber to form the BSG layer, or that silicon, oxygen, boron, and phosphorus sources are provided into the chamber to form the BPSG film.

However, because EP 348 discloses that providing a substrate in a reaction chamber, providing silicon, oxygen, and boron sources into the chamber is effective for forming a BSG layer on the substrate and flowing silicon, oxygen, boron, and phosphorus sources into the chamber is effective for forming a BPSG layer on the substrate (page 29, line 24-page 31, line 20), it would have been obvious to have deposited the BSG and BPSG layers in this manner with a reasonable expectation of these steps being suitable for forming these layers.

KR 915 in view of EP 348 fails to explicitly disclose the predetermined period of time selected relative to the desired nitride layer consumption during a subsequent anneal. However, EP 348 discloses annealing the doped silicate layers after deposition to reflow, planarization of the deposited film, and assisting in gap-fill. Therefore it would have been obvious to one of ordinary skill in the art to anneal the layers in the process of KR 915 in view of EP 348 to reap the benefits of reflowing to planarization of the deposited film and assist in gap-fill.

As to claims requiring an amount of time for which phosphorus source is not introduced in the chamber, this clearly depends on the desired thickness of the BSG layer, deposition rate etc. (see EP 348 at page 30, lines 17-20), therefore, it would have been obvious to have adjusted the amount of time phosphorus source introduction is delayed to values in the claimed range so as to achieve the desired BSG thickness prior

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to forming the BPSG film. The process of KR 915 in view of EP 348 discloses forming a film comprising BPSG on BSG on silicon nitride. The BSG layer of KR 915 in view of EP 348 has a similar thickness as the BSG layer taught by the applicant, see paragraph 0056. Therefore, the prior art and the present claims teach all the same process steps and thus the results obtained by applicants process must necessarily be the same as those obtained by the prior art. Therefore by annealing BSG and BPSG on a nitride, it must necessarily result in consumption of the underlying nitride layer. Either 1) the applicant and the prior art have different definitions annealing, or 2) the applicant is using other process steps or parameters that are not shown in the claims. Thus it is the examiners position that the time selection is relative to the nitride consumption as required by the claim.

7. Claims 14-17 rejected under 35 U.S.C. 103(a) as being unpatentable over KR 915 in view of EP 348 as applied above, and further in view of EP 1139403 (EP 403).

The above applied art does not explicitly disclose delaying introduction of the source gases into the chamber until their flows stabilize. However, because EP 403 discloses that allowing the source gases to bypass the chamber until their flows stabilize when depositing doped silicon oxide films such as BPSG prevents higher dopant concentrations in the first few nanometers of the film and provides a homogenous dopant concentration in the film (0005-0009), it would have been obvious, to delay introduction of the source gases to the chamber until their flows stabilize so as to achieve a homogenous dopant concentration in the film.

***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

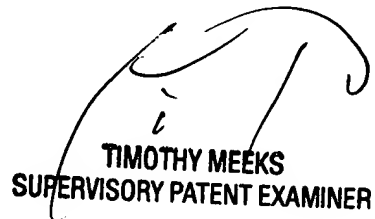
Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

David Turocy  
AU 1762



**TIMOTHY MEEKS**  
**SUPERVISORY PATENT EXAMINER**